THE INFLUENCE OF VIEWING MEDICAL DRAMAS ON ACCEPTANCE OF COMMERCIAL UNMANNED AERIAL SYSTEMS FOR MEDICAL FLUID TRANSPORTATION

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Abstract

This study evaluated the influence of viewing medical dramas on participants' acceptance of drone use for medical fluid transport. Participants were 199 individuals ages 18 and over recruited via Survey Monkey Audience. Participants responded to an online survey about their attitudes towards drone use for medical fluid transportation and their television viewing activity. The survey tested the ability of medical dramas to cultivate and develop mainstream attitudes towards drone use for medical fluid transport. Results found that attitudes towards medical fluid transporting drones were not susceptible to cultivation or mainstreaming effects simply due to medical drama viewership. A discussion of these results as well as directions for future research are offered.

Preface

I would first like to thank my thesis advisor, Dr. LaKesha Anderson, for her dedication and patience while working to guide me through this thesis process. Additionally, I'd like to thank other professors at Johns Hopkins University for steering me towards the intersection of my interest in aviation and an area of pressing medical need. Finally, I'd like to thank my mother, Dr. Rini Ghosh, for her continual support of my educational efforts and for always being an inspiration.

The rapid deterioration of my father's health during studies at Johns Hopkins University contributed to the thesis project being changed away from being about education or aviation and into the topic being discussed in this thesis today. In my family's struggle with dad, I found that the actual struggle wasn't medicine itself but the patient's acceptance of the proper medical regimen. The question remained as to how, at an earlier stage of a medical issue, a patient can be better convinced to take necessary medical steps.

Dedicated to my mother, Dr. Rini Ghosh, and to my late father, Abhik Kumar Ghosh.

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The Influence of Viewing Medical Dramas on Acceptance of Commercial Unmanned Aerial Systems for Medical Fluid Transportation

The Federal Aviation Administration (FAA) is forecasting an over 300% increase in sales of commercial Unmanned Aerial Systems (UAS) between 2016 and 2017 (FAA, 2016). The year 2017 is being hailed as a "big turning point in drone adoption by businesses" (Vanian, 2016, para. 4). However, feedback on UAS usage, popularly referred to as "drones" (NASA, 2015), indicates that public acceptance of drone use is mixed. While 59% of respondents to a 2015 survey on commercial drone use would "always" or "often" permit drones for utility and property inspection in rural areas, this support drops to 37% on the topic of drones delivering packages to homes or businesses (Chubb, 2015). Though public acceptance of commercial drone use for property inspection, package delivery, and agriculture continue to be measured by major surveys and the FAA (FAA, 2016, p. 33), emerging commercial drone use is largely unexplored. More recently, research on utilizing drones for the transportation of medical fluids demonstrates its safety and feasibility (Aho, Jenkins, Thiels, & Zietlow, 2015; Amukele, Howard, Pepper, Sokoll, & Street, 2015). These positive results justify societal consideration of drone utilization for medical transport purposes. Various stakeholders in this emerging field seek strategies to influence public acceptance of drone utilization for medical transportation purposes. One way in which society is influenced about the medical field is by viewing medical dramas (Beck, 2014).

This study will examine the effects of viewing medical dramas on the acceptance of drone usage for medical transport purposes. This research is important for multiple stakeholders. Scholars will benefit from this research because it contributes to the body of research on a relevant and tested theory of mass media effects. Medical industry stakeholders can benefit from this research as they are interested in increasing acceptance of drone use for medical

transportation. Furthermore, media producers and health communication practitioners can benefit from this research as they work together to generate story content to influence and improve health outcomes for their audiences.

Literature Review

Academic research on mass media effects includes numerous studies exploring Gerbner and Gross's 1976 cultivation theory (see Gerbner & Gross, 1976a; 1976b). The theory originally explored the influence of television viewing on viewers' perceptions of violence. Over time, the scope of the cultivation theory expanded beyond the issue of violence (Potter, 2014) into issues such as attitudes towards family, minorities, and even health-related issues (Morgan & Shanahan, 2010). Cultivation theory may also explain how viewers of television medical dramas perceive medical issues and medical professionals. Furthermore, this theory could explain the impact that viewing televised medical dramas has on perceptions of issues presented in television programming.

Cultivation Theory

Cultivation theory explains the effects of television viewing on individual viewers' perceptions. While early research on the effect of television viewing on perceptions of violence (Gerbner & Gross, 1976) thrust the theory onto the academic-stage, scholars soon began exploring this theory as a means of explaining media effect on a multitude of other issues (Glynn, Hardy, Huge, Reineke, & Shanahan, 2007), values (Burroughs, Rindfleisch, & Shrum, 2005), and narratives (Bilandzic & Busselle, 2008). The theory was later reinforced with subordinate constructs such as mainstreaming and cultivation that served to make the theory more robust (Gerbner, Gross, Morgan, & Signorielli, 1980).

Gerbner and Gross (1976) first demonstrated the ability of television dramas to cultivate viewers' perceptions of social reality on the issue of violence. Their findings indicate that television's social reality influenced the social realities of television viewers about violence. The findings also supported a cultivation differential whereby heavier television viewers were more greatly impacted by the realities presented on television (Gerbner & Gross, 1976). Interestingly, these findings were the same even when controlled for college education and exposure to newspapers, thus leading Gerbner and Gross to state that no one was "immune to its [television's] effects" (1976, p. 20). Gerbner and Gross's original research is supported by recent studies on cultivation theory as well. Aday, Jamieson, and Romer (2003) studied the relationship between local television viewing and viewers' fear of crime. The findings on the relationship between local television news viewing and viewers' fear of crime evidenced cultivation theory with an increase in watching television news being linked to an increase in viewers' feeling crime was a problem (Aday, Jamieson, Romer, 2003).

Expanding the Scope of Cultivation Theory

Studies that have expanded on the original scope of cultivation theory include Glynn, Hardy, Huge, Reineke, and Shanahan's 2007 study that researched daytime talk shows and viewers' opinions about how involved the government should be in family issues. Glynn, Hardy, Huge, Reineke and Shannon (2007) hypothesized that viewing daytime talk shows would influence support for increased governmental involvement in family issues. The findings indicated that increased viewing of talk shows cultivated a positive impact on viewers' support for government programs dealing with family issues.

An additional study by Burroughs, Rindfleisch, and Shrum (2005) examined the ability of television viewing to influence viewers' materialistic attitudes. The researchers predicted a

positive relationship between the amount of television viewing and viewer levels of materialism. Findings supported existing cultivation literature by demonstrating increased television viewership positively correlates to increased levels of materialism. The study expanded the applicability of cultivation theory beyond effects on viewers' perceptions to include effects on viewers' values as well.

A study by Bilandzic and Busselle (2008) explored transportation, defined as "losing one's self in a narrative" (Bilandzic & Busselle, 2008, p. 508) to demonstrate cultivation by narratives in films, books, and television. Findings supported that cultivation was more apparent in viewers' identified as having more transportability (Bilandzic & Busselle, 2008). Bilandzic and Busselle (2008) argued that future research should consider that cultivation may not just influence viewers' standpoints on issues, but also on specific issues in televised narratives, like views on robbery as opposed to the general topic of crime. While cultivation theory answered many questions about media effects, the theory was expanded to include the additional constructs of mainstreaming and resonance.

Constructs of Cultivation Theory

Gerbner, Gross, Morgan, and Signorielli (1980) identified constructs that reinforce cultivation theory and helped explain differences between groups of viewers. These constructs are mainstreaming and resonance. Mainstreaming refers to the commonality of views among heavier viewers, where light viewers hold more divergent views (Gerbner, Gross, Morgan, & Signorielli, 1980). Resonance refers to television "reality" reflecting actual or perceived reality thereby resulting in the cultivation of particular attitudes (Gerbner, Gross, Morgan, & Signorielli, 1980). Gerbner, Gross, Morgan, and Signorielli's findings demonstrate resonance by showing that expressions of fear had special concern for city residents since television viewing led to a

higher level of fear in city residents versus suburban residents. They also found mainstreaming explains why heavier viewers of television more frequently thought they would encounter violence versus lighter viewers of television.

Research on cultivation theory demonstrates a long record of diverse applicability and continued deployment. These results of studies on cultivation theory support the core tenants of the theory and its ability to explain media effects on viewers' perceptions on issues, values, and narratives.

Mainstreaming

The findings of various studies demonstrate support for mainstreaming effects, as first posited in Gerbner, Gross, Morgan, and Signorielli's (1980) cultivation theory. The effects of mainstreaming are evidenced in studies on viewer attitudes towards racial segregation and minority rights (Gerbner, 1998), the natural environment (Good, 2009), and consumption beliefs (Curias, Faber, O'Guinn, Schmitt, 1989). Yet, other research suggests that mainstreaming may only be narrowly applicable, explaining that television affects viewers only on select topics (Bischak & Shrum, 2001).

Gerbner (1998) explored the concept of mainstreaming by looking at television viewership and attitudes as well as opinions on topics like racial segregation and minority rights. Gerbner (1998) found that heavy television viewers had more homogenous attitudes and opinions than lighter viewers. Gerbner stated that the, "amount of viewing was far more important than specific exposure to news" (Gerbner, 1998, p. 188), highlighting the applicability of both mainstreaming and cultivation theory to explain television's effects on viewers.

Good's (2009) study demonstrates mainstreaming of environmentalists' attitudes on the natural environment through television viewing. Good (2009) hypothesized that heavy television

viewers would have attitudes similar to the general public's attitudes about the natural environment, versus the attitudes of light viewers. Study results demonstrated not only the prevalence of the mainstreaming effect but Good went a step further to highlight that environmentalists, a group especially knowledgeable about the topic of the natural environment, may be "especially 'vulnerable' to television" (Good, 2009, p. 290).

Curias, Faber, O'Guinn, and Schmitt (1989) studied the impact of television viewing on consumption beliefs. The results demonstrated a mainstreaming effect among heavier viewers of television on consumer beliefs. Similar to the findings by Good (2009), the study found that the influence of television viewers was dependent on viewers' relevant issue experiences (Curias, Faber, O'Guinn, & Schmitt, 1989). However, they did note that cultivation could occur in both high and low personal experience environments.

Bischak and Shrum (2001) studied viewers' attitudes of risk and crime. In this study, findings did not support a mainstreaming effect; rather the study highlighted the role of personal experiences in the formation of attitudes. The results of this study directly contrast Good's (2009) findings by demonstrating that there may also be audiences that, due to lack of personal issue experience, may be more immune to mainstreaming and the effects of television viewing. Bischak and Shrum (2001) further suggest that the scope of mainstreaming applicability is limited to "particular dependent variables, such as political orientations and beliefs" (Bischak & Shrum, 2001, p. 208).

While there is support for mainstreaming in relevant literature, viewers' personal issue experience may determine whether or not television viewing influences audiences. Mainstreaming literature suggests that a lack of viewers' personal experience with issues

presented in television leads to less cultivation and less mainstreaming. This may imply a lower influence of media on issues where viewers have less personal experiences.

Medical Dramas and Cultivation Theory

Research demonstrates that increased viewing of medical dramas cultivates viewers' perceptions and behaviors on medical issues but not perceptions of medical professionals. For instance, increased viewing of medical dramas was found to cultivate viewers' fatalistic beliefs about various illnesses (Chung, 2014). Increased viewing of medical dramas was also found to cultivate viewer feelings about the importance of medical issues presented in medical drama storylines (Heischmidt & Stinson, 2012). However, increased viewing of medical dramas does not appear to change perceptions of physicians (Cho, Choi, & Wilson, 2011; Chory-Assad & Tamborini, 2003).

Chung's (2014) study tested the influence of viewing medical dramas on beliefs and perceptions of health. Chung hypothesized that heavy viewing of medical dramas would lead to more fatalistic beliefs about illness. Findings supported Chung's hypothesis and not only supports the cultivation theory but also lends credence to the idea that viewers of medical dramas develop more fatalistic beliefs as a result of viewing medical dramas.

An additional study by Heischmidt and Stinson (2012) demonstrated significant cultivation of attitudes about medical issues presented in medical dramas. The study's findings revealed that respondents who, on average, watched more television were more likely to discuss medical issues presented in medical dramas with their physicians (Heischmidt & Stinson, 2012). These results support the cultivation theory by demonstrating that increased medical drama viewing increased viewers' abilities to identify perceived important medical issues and led more viewers to ask their physicians about the medical issues presented in medical dramas. While

research demonstrates the effects of medical dramas on perceptions of medical issues, the research is mixed on whether medical dramas influence perceptions of medical professionals.

Research on the effect of medical drama viewership on perceptions of physicians is varied, at best. Chory-Assad and Tamborini (2003) tested the effects of medical drama viewing on perceptions of physicians. Findings validated the cultivation theory, as increased medical drama viewership led to diminished perceptions of physicians (Chory-Assad & Tamborini, 2003). However, a study by Cho, Choi, and Wilson (2011) found a separation from the trend observed by Chory-Assad and Tamborini (2003). Cho, Choi, and Wilson (2011) also tested the effects of medical drama viewership on perceptions of physicians. Their findings failed to support the cultivation theory as the study did not demonstrate a relationship between medical drama viewership and viewers' perceptions of physicians (Cho, Choi, & Wilson, 2011).

This body of research demonstrates medical dramas' ability to cultivate viewers' perceptions and behaviors about medical issues. These results further affirm the applicability of cultivation theory. Research also demonstrates mixed results for the ability of medical dramas to cultivate perceptions of medical professionals. These results suggest that medical dramas may not be as effective in cultivating viewers' perceptions of professionals as they are at cultivating viewers' perceptions of medical issues.

Medical dramas influence viewers regardless of viewing habits. While medical drama representations of medical realities was found to misrepresent reality and foster patient "trust in miracles" (Diem, Lantos, & Tulsky, 1996), medical dramas also cultivate medical interest. This is evidenced by a study in which over half the students of a CPR class attributed motivation to take the course to viewing popular television medical dramas (Avital, Eisenman, Rusetski, Stolero, & Zohar, 2005). Given the ability of medical dramas to cultivate viewers' attitudes and

behaviors in several ways, studying the cultivation of medical drama viewers' acceptance of new technologies in the medical field is warranted.

While scientific breakthroughs in medicine are often covered by the press, advancements in global healthcare systems do not yet receive similar press attention. The nation's infrastructure creates obstacles for the rapid transportation of vital medical fluids and medical materials, like organs. This is especially true in population dense cities (Wapner, 2016). However, the use of drones may provide futureproofing "to transform medical supply chains" (Davies, 2016) and their use may provide a solution to the currently dysfunctional medical transport chain that is hindered by a weakened and older infrastructure. Drone use may result in more lives saved as a result of vital medical fluids and organs arriving on time. Despite the need and the possible benefits of drone use, unless the sentiments of the public towards such a revision to the medical transport chain are well understood, drone use may never be accepted as a mainstream method of medical fluid transportation.

Methodology

To measure the cultivation and mainstreaming effects of medical dramas on acceptance of UAS for medical fluid transportation, a quantitative methodology was used.

Overview

This section contains the hypotheses and justification for these hypotheses, as well as a justification for the methodology used. A quantitative methodology was used for this study as opposed to a qualitative methodology as it allowed for the testing of specific theoretical tenants, namely mainstreaming and cultivation. Given these parameters, the following hypotheses were posed.

Hypotheses

H_1: Increased viewing of medical dramas will result in greater acceptance of drone use for medical fluid transportation.

Null H_1 : There is no relationship between increased viewing of medical dramas on acceptance of drone use for medical fluid transportation.

H_1 predicts a cultivation effect.

H_2: Individuals who have personal experience with drones will be more likely to accept drone use for medical fluid transportation.

Null H_2 : There is no relationship between personal experience with drones on acceptance of drone use for medical fluid transportation.

H_2 predicts that personal experience affects attitudes.

H_3: Heavier viewers of medical dramas will exhibit similar attitudes about drone use for medical fluid transportation relative to lighter viewers of medical dramas whose attitudes will be more varied.

Null H_3 : There is no relationship between levels of medical drama viewership on exhibiting specific attitudes about drone use for medical fluid transportation.

H_3 predicts a mainstreaming effect.

Research Design

All three hypotheses utilized the same dependent variable of acceptance of drone use for medical fluid transportation. This dependent variable was inspired by previous literature like Chung (2014) where perceptions of health were the result of influence from viewing medical dramas. For hypothesis one, the independent variable of increased viewing of medical dramas was influenced by previous research by Heischmidt and Stinson (2012) who found that

increasing medical drama viewership demonstrated cultivation. For hypothesis two, the independent variable of personal experience was influenced by research by Bischak and Shrum (2001) who found increases in audience immunity to cultivation and mainstreaming effects based on lack of viewer personal experience with an issue.

The third hypothesis was intended only to test the mainstreaming effect and was inspired by Gerbner (1998). Gerbner compared a heavier viewer group with a lighter viewer group to determine if there was increased homogeneity among the responses of the heavier viewer group. The two independent variables were the viewing groups, and was inspired by previous literature that made a similar demarcation between the groups (Good, 2009).

Survey Instrument

The objective of this study was to understand the relationships between multiple variables. A survey was utilized as it measures the "subjective feelings of the public" (Fowler, 2014, p. 2). A survey was administered since the survey framework allows for understanding relationships between variables and also the differences in population groups (Krosnick, Lavrakas, & Visser, 2000). Online surveying was utilized as it affords a compromise between surveying cost and generalizability (Deutskens, de Jong, de Ruyter, & Wetzels, 2006). Compared to the face-to-face survey design, online panel research attracts more viewpoint-oriented and knowledgeable samples that have a lower chance of exhibiting social desirability bias induced by an interviewer (Bremer, Duffy, Smith, & Terhanian, 2005).

The online survey was available on Survey Monkey from November 4-6, 2016. The survey instrument (see Appendix A) took participants approximately ten minutes to complete. Before beginning the survey, all participants completed a screening test for exclusion criteria in which participants answered questions about their age and television medical drama viewership.

All participants gave their consent for participation in this study via an online informed consent statement on the study's online introduction page. Participants who did not provide consent were immediately terminated from participating further and were unable to enter the study questionnaire. The study design, including participant recruitment and survey instrument, were approved by Johns Hopkins University's Homewood Institutional Review Board (HIRB).

The survey was divided into four question sections: demographics, television viewing habits, attitudes, and personal experience. The survey design strictly used closed-ended questions coupled with nominal completion questions, dichotomous questions, and Likert-type response formats. Close-ended questions were used to collect information on participants' demographics, attitudes, and experiences and also to minimize participant burden and decrease participant drop-out rates, as can happen when participants repeatedly answer open-ended questions (Hlebec, Manfreda, Reja, & Vehovar, 2003).

Television viewing habits were measured using 5-point ordinal value scales. Participants responded to questions on their overall television viewing habits and their medical drama viewing habits by selecting one of the five ordinal value ranges on their estimated hours of viewing per week. Recent academic research measured television viewing using nominal value scales ranging from 4-point scale (Glynn, Hardy, Huge, Reineke, & Shanahan, 2007) to 8-point scale (Bilandzic & Busselle, 2008). However, Heischmidt and Stinson (2012) defended using self-reported data on television viewing in the form of "hours viewed" (Heischmidt & Stinson, 2012, p. 72), citing Potter (2014), as this leads to a larger variance of responses and better analysis.

Attitudes towards issues were measured using responses to 5-point Likert-scale questions. Likert-scales were used to measure attitudes in previous cultivation research (Good,

2009). Participants' acceptance for drones being used for medical purposes was also measured using a Likert scale. Finally, personal experience with the topic of drones was measured using responses on a dichotomous (yes/no) scale that Bischak and Shrum (2001) previously used to gauge survey participant's direct experience with crime. In the survey, participants responded either "Yes" or "No" to whether they had personal experience with drones.

The survey benefited from both face and content validity. Face validity is demonstrated in various ways including readability, feasibility, clarity of wording, and an optimized layout and style (Venkitachalam, 2015). Readability and clarity were ensured by using very specific and straightforward questions while feasibility was facilitated by the gradual progression of question difficulty and specificity. Content validity was ensured by asking concise and straightforward questions that related directly to each variable being tested and the hypotheses guiding the study. Further, the survey presented these questions in a manner that ensured testability.

Participant Recruitment Procedures

Participants were derived from the online survey panel community called SurveyMonkey Audience (SMA) because it offers "quick, relatively inexpensive access to a large participant pool" (Brandon, Long, Loraas, Mueller-Phillips, & Vansant, 2014, p. 9). While a non-random convenience sample of this population was used for the study, SurveyMonkey claims that the SMA population is diverse and reflective of the national population (SurveyMonkey Audience, 2013). Budgetary constraints limited the scope of the study to 200 survey participants recruited via SMA. This study attempted to mitigate against non-response error which is a known pitfall of online surveying (Couper, 2000, p. 466) by relying on the SMA platform, which was designed to deliver survey responses by engaging a large pool of incentivized online survey panelists readily available to complete surveys. To participate in the survey, participants were required to be a

U.S. based SMA member and be 18 years of age. Additionally, participants were required to have watched, at minimum, one hour of any televised medical drama in the past month.

The study indirectly compensated participants. While no immediate incentive was provided to participants by the study author, SMA was compensated at a rate of $2.50 per participant and SMA, in turn, provided survey respondents with two monetary incentives. These monetary incentives are standardized for all SMA surveys and include a $ .50 donation to a charity the participant chooses from a list of SurveyMonkey's charity partners, and a direct incentive in the form of a single entry to a weekly sweepstakes contest (SurveyMonkey Audience, 2013). Prior to recruitment, the participants were identified by SurveyMonkey's systems and were all from the United States of America. All participants were contacted by SMA and there was no direct outreach to prospective participants by the study author.

Participants

Participants were 199 individuals aged 18 and over who were recruited through the Survey Monkey SMA. Participants were mostly female (N=118; 59.6%) with the majority of respondents falling in the 45-59 years of age group (N=73; 36.9%). Only 37.9% of respondents (N=75) reported incomes of less than $ 50,000 dollars. Additionally, over half of the participants possessed a bachelor's degree or higher (N = 106; 53.5%). An overwhelming majority of participants (N=151; 75.9%) reported no personal experience with the topic of drones. Individuals watching 10 or more hours of television per week comprised the largest weekly television-viewing group (N=78; 39.4%). However, the vast majority of participants (N=167; 83.9%) reported watching three or less hours of medical dramas per week.

Conceptualization and Operationalization of Variables

The conceptualization of constructs consisted of focusing on the meaning of words such as *acceptance*, *attitude*, and *support* towards drone use for medical fluid transportation. The interchangeable use of these words did not change the conceptualized meaning of one's positive or negative feelings towards drone use for medical fluid transportation. Operationalization existed for participants on a 5-point Likert-type scale in which respondents could choose if their acceptance, attitudes, or support ranged from not at all supportive to very supportive. The term 'medical dramas' was defined and conceptualized based on the loose definition of the term from previous cultivation research which defined medical dramas as, "television programs based in medical environments" (Record, 2011, p. 10).

Operationalization for each hypothesis was mapped directly to scales on questions. For H_1, the construct of increased viewing of medical dramas was operationalized as a question that asked how many hours a respondent watched television medical dramas in the past week. Respondents answered using 5-point Likert-type scale. In H_2, the construct of having personal experience with drones was operationalized by a binary response answer in which respondents could only answer yes or no. The construct of 'personal experience' with drones was conceptualized as being a measure of whether an individual had personally operated a drone.

For H_3, the construct of heavier viewers and lighter viewers was operationalized using previous research as guidance. Respondents first indicated how many hours they watched television medical dramas in the past week using a 5-point Likert-type scale. Then, the construct of heavier viewers was applied to viewers who watched more than 10 hours per week of medical dramas, while the lighter viewers construct was applied to viewers watching less than this amount.

Analytical Procedures

The statistical software package IBM SPSS Statistics Grad Pack 23 & 24 was used to analyze data collected in this study. Specifically, I used Correlation Analysis, the Mann-Whitney U test, and One-Way Analysis of Variance (ANOVA) to analyze the data of this pilot study.

The first hypothesis predicted that increased viewing of medical dramas would result in greater acceptance of drones for medical transportation. This was tested using correlation analysis as correlation analysis can identify the "strength of the relationship between two sets" of variables (Lind, Marchal, & Wathen, 2015, p. 430).

The second hypothesis predicted that personal experience with drones relates to acceptance of drone use for medical transportation. This hypothesis was tested using the Mann-Whitney U Test. This statistical test can, "compare differences between two independent groups when the dependent variable is either ordinal or continuous" (Lund Research Ltd, 2013), with drone acceptance being the dependent variable, or dependent on, the variable of personal experience.

For the third hypothesis, a One-Way ANOVA (F-test) was used to identify the effect that differing amounts of medical drama viewing had on attitudes about drone use for medical purposes. The One-Way ANOVA was selected as it is a commonly utilized test to find "statistical differences among the means of two or more groups" (Kent State University Libraries, 2016). An F-test was used to answer this hypothesis as the test allows for comparing two variances (Frost, 2016); in this case the variance between lighter and heavier viewers on attitudes about drone use for medical fluid transportation.

Results

While the SMA sent surveys to 536 potential respondents, only 199 surveys were either fully or partially completed and returned, for a 37.1% response rate. The following section examines the findings of this study.

Hypothesis 1

The first hypothesis stated that increased viewing of medical dramas will result in greater acceptance of drone usage for medical fluid transportation. A Spearman's correlation was used to identify the relationship between viewing medical dramas ($M = 1.99$, $SD = .735$, $N = 199$) and acceptance of drone usage for medical fluid transportation ($M = 3.30$, $SD = 1.209$, $N = 199$) (Table 1a). A very weak positive correlation was found between these two variables, however, this correlation was not statistically significant $r(197) = .047$, $p = .508$ (Table 1b). Thus, the first hypothesis was not supported and the null hypothesis was accepted.

Hypothesis 2

The second hypothesis stated that individuals who have personal experience with drones will be more likely to accept drone use for medical fluid transportation. Those with personal experiences with drones were found to be more accepting of drone use for medical fluid transportation ($M = 3.56$, $Mr = 113.05$, $n = 48$) than those without personal experience with drones ($M = 3.21$, $Mr = 95.85$, $n = 151$) (Table 2a; Table 2b). A Mann-Whitney U test revealed no statistical significance of the results, Mann-Whitney $U = 2997.5$, $N_1 = N_2 = 199$, $p = .062$ (Table 2c). Thus, the second hypothesis was not supported while its corresponding null hypothesis was accepted.

Hypothesis 3

The third hypothesis stated that heavier viewers of medical dramas will exhibit similar attitudes about drone use for medical fluid transportation relative to lighter viewers of medical dramas whose attitudes will be more varied. Heavier viewers (those watching four or more hours of medical dramas per week) reported more homogenous attitudes about drone use ($M = 3.66$, $SD = .902$, $N = 32$) versus their lighter viewing counterparts ($M = 3.23$, $SD = 1.25$, $N = 167$), as evidenced by their comparative standard deviations (Table 3a). While the difference in standard deviations between the two groups may appear to be significant, this was statistically not the case as an F-test revealed no statistical significance between viewing frequency and attitude variance, $F(1,197) = 3.417$, $p = .066$ (Table 3b). Thus, the third hypothesis was not supported and the corresponding null hypothesis was accepted.

Discussion

This study measured the cultivation and mainstreaming effects of medical dramas on acceptance of UAS for medical fluid transportation. While the study failed to register statistically significant support for both cultivation and mainstreaming, the results demonstrate that testing for cultivation and mainstreaming may be more complicated than previously thought. There are several reasons that complicate studies of cultivation theory that have been cited by previous academic research. One of these reasons involves the ability of participants to be influenced by factors outside of the scope of testing, hindering the ability of researchers to reliably test this theory.

The attitudes of television viewers on the issue of UAS is not isolated to only judgments made from watching television medical dramas. As Morgan, Shanahan, and Signorielli (2015) noted, “most viewers still watch more than one genre” (p. 691), even though studies, “assume

they are observing the independent contribution of exposure to that genre" (p. 691). Given the wide variety of media items covering the issue of drones when this survey was conducted, judgments about drone use in the medical field could have been influenced by several confounding variables including drone related segments in news media coverage, non-medical television show coverage, and even motion picture coverage. The influences of these confounding variables are likely to impacted responses thus hindering, if not prohibiting, the effort to determine the cultivation of a specific issue through a single medium.

Furthermore, unless prior content analyses of medical dramas can shed light on television portrayal of a specific issue (Record, 2011), a major vulnerability of cultivation testing is attempting to generalize micro-narratives in genre-specific shows to larger societal narratives and themes. In her study on cultivation theory and medical miracles presented in medical dramas, Record (2011) found evidence of cultivation effect with increasing viewership of medical dramas lessening belief in medical miracles (Record, 2011). Had the effect of medical television dramas been uniform, Diem, Lantos, and Tulsky (1996) would not have found that CPR viewing in television medical dramas would lead to increased belief in medical miracles. The directly opposite results, though they both evidence cultivation, underscores the need to conduct prior content analyses of television medical dramas to understand the portrayal of a specific issue and cultivation effect directionality.

The composite body of cultivation research provides some level of directionality for the expectations of increased television viewership. While content analyses may seem necessary for modern cultivation testing, this structural lack of content analysis in cultivation theory was intentional as it conformed to Gerbner's (1978) tenet that, "lessons [provided by television to viewers]… cannot and need not be specifically related to specific elements of those or other

shows. They can and should be seen as generalized responses to the central dynamics of the world of television drama" (Gerbner, 1978, p. 205). The divergence of results found in this and previous studies underscores the need for future cultivation research to conduct content analysis to understand directionality of the perceived cultivation effect in a world that may no longer have Gerbner's "central dynamics" of a uniform media (Gerbner, 1978, p. 205).

On a theoretical level, such discrepancies in findings further demonstrate the need for additional modernization, genre specification, and revisions to Cultivation Theory at a time when content is generated in a much different way than the monolithic media age during which cultivation theory was developed. As Potter and Chang (1990) noted, "The assumption that messages are uniform is questionable, as the accumulating evidence suggests" (Potter & Chang, 1990, p. 315). Indeed, as television delivery is both multi-modal and driven by technology, messages are not uniform and have the ability to be influenced by a number of external factors including targeted advertising, sponsors, and audience-specific content development.

A cornerstone of cultivation theory appears to have sustained support. Gerbner (1978) qualified 'heavier viewers' as those watching more than 4 hours of overall television per day, which in this study was translated to 4 hours of medical drama viewing per week. This dilution of the 'heavier viewer' raw television viewing was done to provide more realistic numbers better suited for the niche genre of medical dramas. This dilution was similarly extended to a qualifying condition where participants had to have watched at least one hour of a televised medical drama in the past calendar month to ensure their participatory relevance to the study.

While it is plausible that a heavier viewer of general television may watch more than four hours of television a day, a 2014 Nielsen finding showing that heavy television viewers watch almost 12 hours a day; these numbers needed to be diluted to realistic numbers in the medical

drama niche where heavier viewers may only find four hours of weekly medical drama content in the form of new episodes and/or reruns. Since only 16.1% of respondents (N =32) reported watching four or more hours of television medical dramas weekly, the four hour timepoint allowed a plausible heavier viewer demarcation. However, the Nielsen 'heavier viewer' demarcation spurred the creation of a separate set of television viewer groups for analysis. Nielsen's heavier viewer group was translated in this study as watching 10 or more hours of medical television dramas weekly, the highest on the scale. Interestingly, Nielsen Heavy Viewers ($M = 4.67$, $SD = .58$, $N = 3$) were found to be more supportive of drones being used for medical fluid transport purposes versus Nielsen Lighter Viewers ($M = 3.28$, $SD = 1.21$, $N = 196$). An F-test (one-way ANOVA) revealed statistical significance for this result $F(1,197) = 3.97$, $p < .05$. While this finding was only calculated based on three participants in the Nielsen heavier viewers group, it suggests there may be a viewing timeframe after which the attitudes of viewers are differentiated at statistically significant levels and a distinction between a heavier and lighter viewer group becomes noticeable. This critical point may vary by genre and even issue. Future research should attempt to gauge this critical mass style threshold.

There is evidence from previous studies (Chung, 2014; Heishmidt & Stinson, 2014) to suggest that increased medical drama viewership would lead to more fatalistic views or increased personal medical concern, and that these attitudes, equated to this study, would lead to greater acceptance of drone use for medical fluid transportation. While this premise was tested in hypothesis one and failed, another premise, supported by the findings of Bischak & Shrum (2001), was tested to determine if personal experiences influence attitudes. The failure of the second hypothesis is in contrast to the argument made by Bischak & Shrum (2001) that lack of personal experience may lessen the effectiveness of mainstreaming and cultivation on that

individual. In the study, the varying levels of personal experience did not affect attitudes at statistically significant levels and thus could not be used to explain the lack of cultivation and mainstreaming effectiveness.

Bischak and Shrum (2001) also noted that the salience of mainstreaming may be limited to specific dependent variables, such as the topic of political beliefs. This study shows that mainstreaming did not occur on the topic of drone use for medical fluid transportation when the influencing medium was medical dramas. It is not possible to conclude with certainty that the salience of mainstreaming is limited on the specific topic of drone acceptance for medical fluid transportation. Notably, while Good (2009) demonstrated mainstreaming for a second time in her study by changing programming materials, such findings further highlight that mainstreaming results are importantly tied to the actual programming versus being tied to an issue.

Mainstreaming is said to "represent … [the] empirical verification of our assertion that television cultivates common perspectives" (Gerbner, Gross, Morgan, & Signorielli, 1986, p. 31) but this premise was not statistically evident in this study. It appears possible that a direct test of cultivation, where parameters are centered around an observable cultivation differential whereby heavier viewers were more likely to accept the "television answer than lighter viewers" (Gerbner & Gross, 1976, p. 191-192) could fail, as in this study, while some statistically significant evidence (see Nielsen's heavier viewer results) of mainstreaming could still exist, independent of a drastic cultivation test failure. The issue then seems to arise that do these two findings conflict with one other or operate as independent indicators of the cultivation "process." While cultivation theory critics like Hirsch assert that cultivation theory and mainstreaming may ultimately be "nonfalsifiable" (Bischak & Shrum, 2001, p. 207), the significant potential of confounding variables to have diluted the effectiveness of cultivation testing in this study

warrant future studies to take additional safeguards to test cultivation theory in a more sterilized manner.

Practically, there are implications for stakeholders who seek to influence the public about drone use for medical fluid transportation. The effect of currently run medical dramas may not be as effective at influencing perceptions about drones for medical fluid transportation as previous research on similar dramas suggests. There may be multiple reasons for this including that medical drama programming may not include much coverage about drones and that medical transport drones may not be portrayed in the medical dramas in a manner that would be conducive to them creating a positive emotional attachment to viewers. However, this should not deter stakeholders. In fact, to influence medical drama viewers positively about drones, medical drone vendors, medical communications practitioners, media practitioners, and medical drama producers should work closely together to ensure that medical dramas uniformly highlight drones in a positive manner that accurately portrays medical transport drone capabilities. To trigger an emotional attachment to viewers, drones and their roles in medical dramas must be presented in a manner that will enable drones roles to alleviate the fatalistic ideologies that viewers tend to have after they watch medical dramas (Chung, 2014).

Medical transport systems and drone manufacturers operating in the medical drone market have an important role to play in helping transition to mainstream medical drone use. The study demonstrates that personal experiences of respondents led to a statistically significant increase in acceptance of drones for medical transportation; therefore, all stakeholders must play an active part in engaging the population to be personally familiar with drones. Drones continue to increase in popularity among the ideal segment for medical drone stakeholders: average consumers. Consumers during the 2016 holiday season contributed to drones being called “one

of the most sought-after gifts" (Halsey III, 2016), signifying that the popularity of drones may provide some impetus for stakeholders as they work to influence consumers and change attitudes about drone use for medical fluid transportation.

Limitations

There were several limitations of this study. To begin, conforming to increased "heavier viewer" standards such as the Nielsen (2014) 12 hours a day standard was not possible as doing so would have yielded just three respondents into the heavier viewer group, thus eroding generalizability. Though Gerbner continued to assert the importance of macro-level cultivation testing and that such a test would find a singular general trend of cultivation, running tests on the ambiguously defined "medical television dramas" did not account for potential directionality on how the media influenced perceptions of drones. As cultivation can be found in both increasing and decreasing attitudes, a prior content analysis may have provided a common landscape of respondent attitude expectations. Yet, to find individuals watching the same shows, perhaps even the same seasons of a specific show, and to then conduct a survey on this very specific population falls outside of the scope of this study. Notwithstanding, understanding the behaviors motivated by viewing medical dramas may provide quasi-content analysis results and offered the study some level of directionality in expectation of cultivation effects.

The study was further limited by an inability to ensure reliability, despite being able to ensure both face and content validity. Budgetary and time constraints prohibited the option of a test-retest method of ensuring reliability. A split-half test for internal consistency netted low results, meaning reliability could not be assured. However, the low scores of this internal consistency reliability test indicates the need to revise the survey instrument with more topically clustered questions and more consistent scales with equal variances among similar items. It

should be noted, though, that while internal consistency reliability scores were low, this study was a pilot study. Pilot studies lend themselves to the discovery of errors and points of revision. Thus, any future studies that seek to gauge attitudes towards drone use for medical fluid transportation should be revised with these results in mind. Despite the low reliability of this study, this pilot study does provide a better understanding of the attitudes of television viewers about drone delivery of medical fluids.

Two limitations in conceptualization may have further detracted from the effectiveness of the study. Since the term *medical dramas* conformed to previous literature standards and was self-reported by respondents, the possibility existed that participants did not use this definition. Also, respondents may not consider a non-cable provider as a legitimate producer of television medical dramas. This means it is possible that respondents did not consider medical dramas available on such platforms such as Amazon, Hulu, and Netflix. Likewise, *personal experience with drones* was not defined on the questionnaire, leaving open the possibility that respondents could apply any definition of personal experience they deemed appropriate. Personal experience, thus, could have been conceptualized by respondents as watching a news story on drones, having seen a drone in operation, or having heard about drones from a family member or friends. These limitations caused by somewhat ambiguous conceptualizations may have detracted from the overall effectiveness of the study.

Another limitation of this study includes the sample that was used. The use of participants from SurveyMonkey audience (SMA) was not random and thus, the results are not generalizable. Furthermore, the monetary incentivizing of the respondent platform may have artificially skewed recruitment and interest in the survey topic and completions.

A final limitation is that the study focused solely on members of an online panel though the online panel purports to be nationally representative, future research on drone use for medical transportation may want to focus on niche populations to understand their views on the topic to better serve those communities. For instance, communities where there may be more of a need for medical transport drones, like rural communities without abundant medical access, warrants future attention.

Suggestions for Future Research

While this was a pilot study, there are strong recommendations for future research. First and foremost, drones are operating in many ecosystems, from commerce to medicine to military, and warrant greater levels of academic study. While this study provides a first step in exploring attitudes towards drone use for medical purposes, this is a topic rich with opportunity. Future studies could continue to test cultivation and mainstreaming effects. As effects testing becomes more topical over time, further attention should be given to the ability of cultivation and mainstreaming to demonstrate causality. Research could focus on demonstrating how consumption of specific media affects quantifiable sentiments in people about specific things versus aggregate feelings such as fear. Future research should also explore the ways in which cultivation may be multi-directional as well, where specific programming may elicit not only degrees of increasing or decreasing acceptance of a topic, but where programming may elicit degrees of both increasing and decreasing acceptance towards aspects of a topic in the same individual. Additionally, attention to multi-platform media is important, as many television dramas can now be watched without commercial breaks via subscription service. How continual exposure to repeated messages during “binging” impacts acceptance of drone use is an area of potential future exploration.

Conclusion

Drone use for medical fluid transportation is becoming a reality in first-world countries like Australia (Trembath, 2016) and drones have been used successfully in several third-world countries to deliver blood and anticoagulants (Rosenberg, 2016). While there continues to be legitimate concerns about the safety of drone integration into the national airspace system, the likening of the FAA's drone rules to the Wright Brothers' preliminary flights may offer an accurate assessment of both "the historic opportunities and the dangers" (Jansen, 2016) of such use. While drone use for medical fluid transportation is not yet mainstream, it is important to note that drone use offers significant advancements in the transport of medical fluids. As drone use becomes more acceptable for the delivery of various items, including consumer purchases, it is not a matter of whether drones will be used to transport medical fluid, but rather when. Given these advancements, it is imperative for scholars, medical industry stakeholders, media producers, and medical communication practitioners to understand the most effective tactics for increasing public perceptions of drone use for medical fluid transportation.

Tables

Hypothesis 1 Tables

Table 1a.

Descriptive Statistics

	N	Mean	Std. Deviation
In the past week, how many hours of TV Medical Dramas have you watched, on any screen including tablets and cellphones?	199	1.99	.735
How supportive are you of drones being used for medical fluid transport purposes?	199	3.30	1.209
Valid N (listwise)	199		

Table 1b.

Correlations

			In the past week, how many hours of TV Medical Dramas have you watched, on any screen including tablets and cellphones?	How supportive are you of drones being used for medical fluid transport purposes?
Spearman's rho	In the past week, how many hours of TV Medical Dramas have you watched, on any screen including tablets and cellphones?	Correlation Coefficient	1.000	.047
		Sig. (2-tailed)	.	.508
		N	199	199
	How supportive are you of drones being used for medical fluid transport purposes?	Correlation Coefficient	.047	1.000
		Sig. (2-tailed)	.508	.
		N	199	199

Hypothesis 2 Tables

Table 2a.

Report

How supportive are you of drones being used for medical fluid transport purposes?

Do you have any personal experience with the topic of drones?	Mean	N	Std. Deviation
Yes	3.56	48	1.367
No	3.21	151	1.147
Total	3.30	199	1.209

Table 2b.

Mann-Whitney Test

Ranks

	Do you have any personal experience with the topic of drones?	N	Mean Rank	Sum of Ranks
How supportive are you of drones being used for medical fluid transport purposes?	No	151	95.85	14473.50
	Yes	48	113.05	5426.50
	Total	199		

Table 2c.

Test Statistics[a]

	How supportive are you of drones being used for medical fluid transport purposes?
Mann-Whitney U	2997.500
Wilcoxon W	14473.500
Z	-1.867
Asymp. Sig. (2-tailed)	.062

a. Grouping Variable: Do you have any personal experience with the topic of drones?

Hypothesis 3 Tables

Table 3a.

Report

How supportive are you of drones being used for medical fluid transport purposes?

Heavier or Lighter Medical Drama Viewer	Mean	N	Std. Deviation
Lighter	3.23	167	1.250
Heavier	3.66	32	.902
Total	3.30	199	1.209

Table 3b.

ANOVA

How supportive are you of drones being used for medical fluid transport purposes?

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.935	1	4.935	3.417	.066
Within Groups	284.572	197	1.445		
Total	289.508	198			

Appendix A

Screening Tool

(1) In the last month, have you watched at least one hour of a televised medical tv drama?

Yes

No

(2) Are you 18 years of age or older?

Yes

No

--Page Break--

Introduction

Welcome to this short, **ten-minute** survey!

Purpose of the survey. This study seeks to gain a better understanding of how viewing medical dramas influences viewers' attitudes on the issue of drones use for medical fluid transportation.

Importance of this Study. Gaining a better understanding of how media influences consumers' acceptance of new technologies allows scholars, medical industry stakeholders, and media producers create programming that is more effective in increasing viewers' acceptance of new technologies which is paramount in increasing the effectiveness of the medical industry.

Validation: The Homewood Institutional Review Board at Johns Hopkins University has granted approval for this study. All responses will be compiled for statistical analysis. Your

answers will be confidential and will not be linked to you individually. All responses will be protected behind password protected access. Responses stored on SurveyMonkey's SSL enabled servers are protected by Norton and TRUSTe. The survey data will be archived and retained by Mr. Ghosh behind password protected access within 30 days of survey closure indefinitely. Dr. LaKesha Anderson will retain a copy of the survey data for at least three years from the time of study closure with the file being password protected. For more information on survey safety on SurveyMonkey, please visit http://www.surveymonkey.com/mp/take-a-tour/?ut_source=header#safe-secure

This survey is being conducted by Johns Hopkins University graduate student Arin Kumar Ghosh under the direction of Principal Investigator, Dr. LaKesha Anderson. Participants are compensated by SurveyMonkey in the form of a $ 0.50 charity contribution to a participating charity of the participant's choice as well as a sweepstakes entry into a contest operated by SurveyMonkey. You may direct any questions you have about this survey or this study to either Mr. Ghosh at arin.ghosh@jhu.edu or Dr. Anderson at lander73@jhu.edu. By completing this survey or questionnaire, you are consenting to be in this research study. Your participation is voluntary and you can stop at any time.

To begin, please review the following statement and select 'Yes' if you agree.

(3) I was informed about and understand the purpose of this study, how my answers will be used, and my rights as a participant.

Yes

No

(4) I agree to participate in this study.

Yes

No

--Page Break--

Survey

(5) What is the highest educational degree you possess?

None, High School Diploma, Vocational/Trade/Certification, Associates Degree, Bachelor's Degree, Graduate or Professional Degree .

(6) In the past week, how many hours of **TV** including **shows** and **news** have you watched, on any screen including tablets and cellphones?

Less than 1 hour, 1 – 3 hours, 4-6 hours, 7-9 hours, 10 hours or more.

(7) In the past week, how many hours of **TV Medical Dramas** have you watched, on any screen including tablets and cellphones?

Less than 1 hour, 1 – 3 hours, 4-6 hours, 7-9 hours, 10 hours or more.

(8) How supportive are you of drones being used for medical fluid transport purposes?

Not at all supportive, minimally supportive, neutral, somewhat supportive, very supportive.

(9) Do you have any personal experience with the topic of drones?

Yes

No

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Curriculum Vitae

Arin Kumar Ghosh received his Bachelor of Arts in Political Science in 2012 from the University of Southern California (USC), Magna Cum Laude, attending on a near full merit scholarship. While at USC, Arin began to enjoy tutoring and teaching and has quickly ascended through the ranks of the tutoring world with his eyes set on being a professor at a University teaching liberal studies. Arin has been engaged in interfaith and multicultural activities for many years, most recently being selected as one of the Future 50 leaders in Los Angeles, a project of USC and the city's largest interfaith council. His coursework at Johns Hopkins University has focused on social science aspects in aviation with one of his papers on the Asiana Airlines Flight 214 crash being requested as a model graduate paper. Arin hopes to further pursue his own academic studies while continuing in the world of education.